



Conserve O Gram

July 1993

Number 4/4

Creating A Microclimate For Oversized Museum Objects

Museum collections often include oversized objects that are too large to store in standard museum storage cabinets and shelving units (e.g., chairs, bedsteads, canoes, and natural history mounts). A simple method for protecting such museum objects from agents of deterioration is to create a microclimate by sealing an open, steel shelving unit (on which museum objects are stored) in polyethylene sheeting. The sheeting buffers the contents from fluctuations in relative humidity, protects them from dust and pollutants, impedes pests, and provides visual access while discouraging unnecessary handling. The method is practical and easily adapted to a variety of storage situations. This technique can be used with shelving units of any size and configuration. It may be applied to a single shelving unit or to multiple units attached side by side or end to end.

Materials

- Slotted steel shelving unit(s)
- Ceramic magnets
- Binder clips
- 6-mil polyethylene sheeting
- Heatsealer or sewing machine, as needed

Procedures

1. *Assemble the shelving unit(s) into the desired configuration.* The bottom shelf should be approximately 9 inches above the floor. This will facilitate cleaning and monitoring for pests and minimize water damage in case of flooding. The top of the unit can either be a shelf, or simply the steel frame.
2. *Determine the amount of polyethylene sheeting needed to cover the shelving unit(s).*

Rolls of sheeting are sold in various widths. By using plastic sheeting that is 20 feet in width, a single section of sheeting will cover a standard size shelving unit measuring 6 feet high by 4 feet deep from front to back. (Additional sheeting will be needed to cover the ends of the unit). Taller units may be covered by sealing or sewing lengths of the sheeting together.

When calculating the size of the sheeting to be cut, figure slightly more than is actually needed. These additional inches allow for overlapping the sheeting, thus achieving a tighter seal. Cut the sheeting using a straight edge and utility knife.

3. *Cover the ends of the shelving unit(s).* Access to the stored museum objects will be through the widest side of the shelving unit; therefore, the narrow ends can be *permanently sealed*. Clip the sheeting at the top using 3/8-inch capacity binder clips. Gently pull the sheeting taut, and clip it to the bottom of the unit. Wrap 1 to 3 inches of sheeting around the steel framework, and clip it in place.
4. *Cover the front and back of the shelving unit(s).* Add together the height of the front face of the unit, the top, and the back side. Add a few inches to account for folding the plastic sheeting under the bottom shelf. Use one continuous piece of sheeting. Follow the procedures in step 3.

Eliminate gaps by sealing the sheeting tightly to the shelving unit using a combination of binder clips and magnets. The number of magnets needed to keep the sheeting in place

will vary depending on the number of shelves and access slits in the unit, and on how often access to the shelves will be needed.

5. To cover a shelving unit that is more than 6 feet high, it will be necessary to join two strips of sheeting together to form the required continuous strip. To join the strips, make a one inch seam along the width of the strips using either a heatsealer or a sewing machine set for a long basting stitch. Once the strips are joined together, refold the strips to their original width for ease of handling.

With the strip folded, lay it across the top of the unit. Keep the seam parallel to the front edge of the unit. Slowly unfold the sheeting with the heat-sealed or sewn edge facing upward. Secure the sheeting to the top of the unit with a generous number of binder clips and/or magnets.



Overlap the excess onto each end of the unit(s) to completely seal the enclosure. Pull the sheet taut and use magnets to keep the sheeting tight against the steel framework.

Maintaining the Microclimate

Monitoring. The microclimates created using this method should be monitored for environmental stability and visually inspected for pests on a regular basis. If necessary, a desiccant, such as silica gel, may be placed inside the unit to further stabilize relative humidity. See the NPS *Museum Handbook*, Part I (Rev 9/90), Appendix I, for further guidance on use of silica gel.

Condensation. Although the danger of condensation on the polyethylene sheeting is minimal, it may occur. Condensation may result if there is a rapid change in temperature in the building or within the covered shelving unit. It may also be caused by exposure to sunlight which heats the air in the enclosure to a higher temperature than that of the surrounding air. If condensation should occur (usually in response to a dramatic fluctuation in temperature), temporarily open the sheeting to allow the condensation to dissipate. Leave an air space between museum objects and the sheeting to prevent condensation on objects.

Summary

There are three keys to achieving a microclimate using polyethylene sheeting: 1) overlap the edges of the polyethylene sheeting; 2) apply magnets and binder clips generously; and 3) use a heatsealer or sewing machine (where applicable) to prepare a custom fit. The resulting storage unit provides one of the best methods found to date for protecting oversized museum objects.

Sources

- *Slotted steel shelving* is one of the most versatile shelving systems available. When used to store museum objects, slotted steel shelving must be painted. Unpainted galvanized steel may cause chemical damage to objects, and the fine residue left from the manufacturing may adhere to objects. Slotted steel shelving (Dexion®) and cutting tools are available from Interlake, 550 Warrenville Road, Lisle, IL 60531, (708) 719-7072.
- *Plywood shelves* may be used instead of more expensive metal shelves. However, plywood must be coated with an appropriate sealant to contain outgassing of the formaldehyde used in plywood construction. Seal all surfaces, including edges and drilled holes, with a water-based aliphatic urethane (Polyglase Waterborne Finish) or a two-part clear epoxy barrier coating, such as Inner Protect 1000.® Epoxy barrier coating is available from McClean Brothers, 122 North Langley Road, P.O. Box 819, Glen Burnie, MD 21061, (301) 761-9200, or from Interlocks Yacht Finish, Courtaulds Coatings, Technical Division, 2270 Morris Avenue, Union, NJ 07083, (908) 528-1300. If plywood shelves are used with slotted steel frames, the four corners of the plywood sheet will need to be cut at an angle to fit the frame, and to allow installation of corner bolts into the frame. Do not overload the plywood; always place lighter objects on upper shelves and heavier ones on lower shelves.
- *Ceramic magnets*, 1-7/8" x 7/8" x 3/8", with 3 to 4 lbs pull. Ceramic magnets shatter easily when dropped. It is recommended that they be wrapped in electrician's tape before use. Magnets are available from hardware stores or laboratory supply houses, such as Edmond Scientific, 101 E. Gloucester Pike, Barrington, NJ 08007, (609) 547-3488.
- *Binder clips*, 3/8" capacity with folding arms, are available from the General Services Administration and from office supply stores.
- *Polyethylene sheeting*, clear, 6-mil, is available in various widths and lengths from the General Services Administration and from lumber yards.
- *Recommended alternatives to polyethylene sheeting* are cotton muslin, Tyvek,™ or Gore-Tex.® These may be preferable to polyethylene in some cases (e.g., for objects that must not be visible because of cultural requirements). Tyvek is available from E.I. Dupont de Nemours & Co., 1000 Market St., Wilmington, DE 19898, (800) 448-9835. Gore-Tex is available from W.L. Gore & Associates, Inc., P.O. Box 1550, Elkton, MD 21922-1550, (301) 392-4440.
- *Heatsealer or sewing machine* should be obtained as needed. Heatsealers are available from Chiswick Trading, Inc., 33 Union Ave., Sudbury, MA 01776, (800) 225-8708. Polyethylene sheeting can be sewn on most sewing machines. A cone-shaped needle is recommended for sewing plastic; it will cleanly puncture the plastic without causing tearing.

Kim Robinson
Museum Specialist
U.S. Department of the Interior Museum
Washington, D.C. 20240

David Guynes, Site Manager, Museum and Archeological Regional Storage, National Park Service, Lanham, MD 20706, and Elizabeth M. Browning, Staff Curator, Curatorial Services Division, National Park Service, Washington, D.C. 20013-7127 contributed to this *Conserve O Gram*.

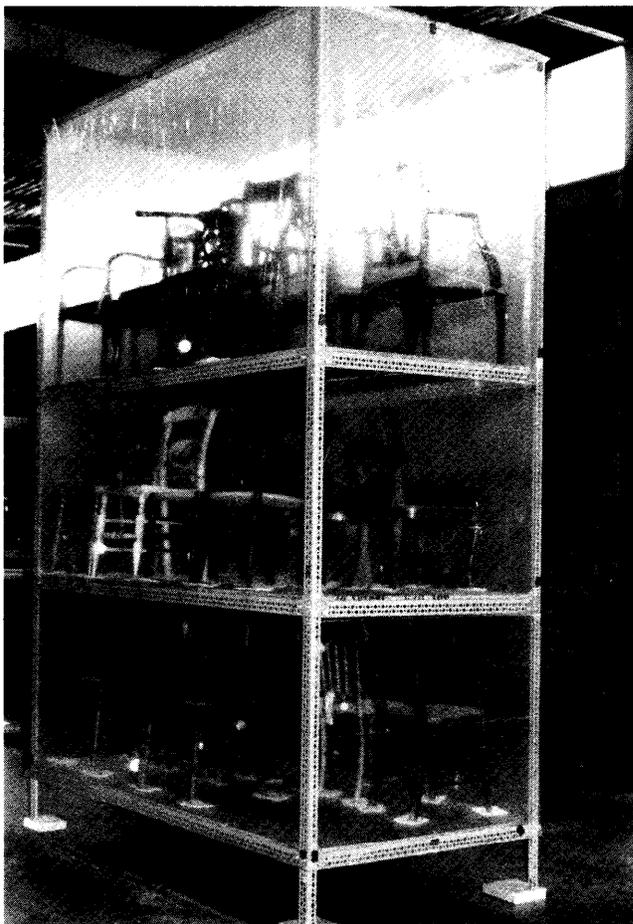
The *Conserve O Gram* series is published as a reference on collections management and curatorial issues. Mention of a product, a manufacturer, or a supplier by name in this publication does not constitute an endorsement of that product or supplier by the National Park Service. Sources named are not all inclusive. It is suggested that readers also seek alternative product and vendor information in order to assess the full range of available supplies and equipment.

The series is distributed to all NPS units and is available to non-NPS institutions and interested individuals by subscription through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, FAX (202) 512-2233. For further information and guidance concerning any of the topics or procedures addressed in the series, contact the National Park Service, Curatorial Services Division, Harpers Ferry, WV 25425, (304) 535-6410.

will vary depending on the number of shelves and access slits in the unit, and on how often access to the shelves will be needed.

- To cover a shelving unit that is more than 6 feet high, it will be necessary to join two strips of sheeting together to form the required continuous strip. To join the strips, make a one inch seam along the width of the strips using either a heatsealer or a sewing machine set for a long basting stitch. Once the strips are joined together, refold the strips to their original width for ease of handling.

With the strip folded, lay it across the top of the unit. Keep the seam parallel to the front edge of the unit. Slowly unfold the sheeting with the heat-sealed or sewn edge facing upward. Secure the sheeting to the top of the unit with a generous number of binder clips and/or magnets.



Overlap the excess onto each end of the unit(s) to completely seal the enclosure. Pull the sheet taut and use magnets to keep the sheeting tight against the steel framework.

Maintaining the Microclimate

Monitoring. The microclimates created using this method should be monitored for environmental stability and visually inspected for pests on a regular basis. If necessary, a desiccant, such as silica gel, may be placed inside the unit to further stabilize relative humidity. See the NPS *Museum Handbook*, Part I (Rev 9/90), Appendix I, for further guidance on use of silica gel.

Condensation. Although the danger of condensation on the polyethylene sheeting is minimal, it may occur. Condensation may result if there is a rapid change in temperature in the building or within the covered shelving unit. It may also be caused by exposure to sunlight which heats the air in the enclosure to a higher temperature than that of the surrounding air. If condensation should occur (usually in response to a dramatic fluctuation in temperature), temporarily open the sheeting to allow the condensation to dissipate. Leave an air space between museum objects and the sheeting to prevent condensation on objects.

Summary

There are three keys to achieving a microclimate using polyethylene sheeting: 1) overlap the edges of the polyethylene sheeting; 2) apply magnets and binder clips generously; and 3) use a heatsealer or sewing machine (where applicable) to prepare a custom fit. The resulting storage unit provides one of the best methods found to date for protecting oversized museum objects.